Journal of Research on the Lepidoptera 20(1): 36-42, 1981(82)

Notes on the Immature Biology of Two Myrmecophilous Lycaenidae: *Juditha molpe* (Riodininae) and *Panthiades bitias* (Lycaeninae)

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Abstract. The early stages, habitat, and biology are described for two sympatric lycaenid butterflies, *Juditha molpe* (Riodininae) and *Panthiades bitias* (Lycaeninae). The larvae of both species use the same foodplant and are tended by ants of the genus *Campanotus*.

Introduction

Juditha molpe (Huebner) is a common riodinid butterfly of the neotropical region ranging from Mexico to Argentina and inhabiting a wide variety of habitats from rainforest to dry tropical scrub. Guppy (1904) recorded *molpe* larvae as feeding on Cassia plants and found in association with "large solitary ants" in Trinidad. His description of the larvae and their interaction with the ants is very sketchy, however. He merely mentions that the ants attend and milk the larvae.

Panthiades bitias (Cramer) is a common hairstreak butterfly of the neotropics, ranging from northwestern and central Mexico to central Brazil. In spite of its being found commonly throughout its range, its biology has not been described. A foodplant records is given in Muyshondt (1973).

The purpose of this paper is to describe the immatures, habitat, and biology of *J. molpe* and *P. bitias* as observed at El Boqueron, Colombia. This paper represents part of a continuing effort to study and record the biology of neotropical Lycaenidae.

Description of Immature Stages

J. molpe

Egg: About 0.5 mm in diameter, slightly flattened above and below. Micropyle small and round, with a dot in the center. Color light green when laid, then turning to tan. Surface covered with a network of thin lines. Duration six days. **First instar larva**, Fig. A. Newly hatched larva 0.9 mm long. Head capsule width 0.2 mm. Head and thorax black, rest light green. Prothorax with eight small dorsal protrusions with a small seta

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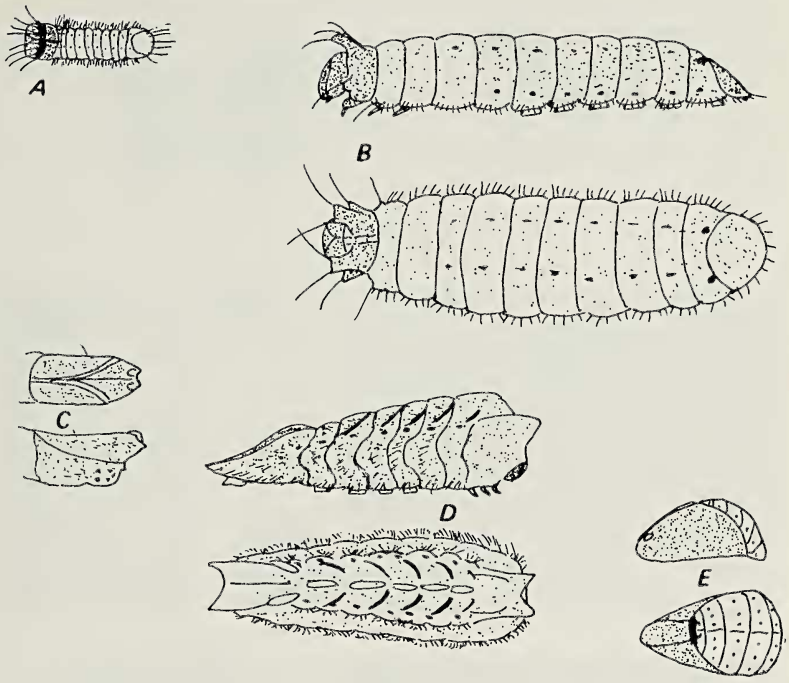

Figure A. First instar larva of *J. molpe*.
Figure B. Fourth instar larva of *J. molpe*.
Figure C. Cephalad part of pupa of *J. molpe*.
Figure D. Final instar of *P. bitias*.
Figure E. Pupa of *P. bitias*.

extending cephalad out of each. Abdomen with small yellow spiracles on the second through eighth segments, and a carapace on the last segment with numerous long setae extending from around its edge. All abdominal and the second and third thoracic segments with small setae bordering the lower edge. **Third instar larva**. Length 5 mm, head capsule width 0.8 mm. Head and prothorax black, rest pale yellow. Prothorax with two deeply bisected horns cephalad with one long seta on each lobe. Also, a smaller protrusion found on each side of the prothorax with two setae extending laterally out of each. Another seta extends laterally from the mesothorax. Abdomen as in first instar with the added presence of two raised myrmecphilous organs on the eighth segment. The setae at the end of the last abdominal segment shorter. Duration six days. **Fourth instar larva**: Fig. B. Length 7.5 to 14 mm. Head capsule width 1.5 mm. Head black. Prothorax light brown, rest olive green. Two rows of small yellow spots dorsally on the abdominal segments. Two myrmecophilous glands

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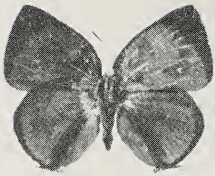

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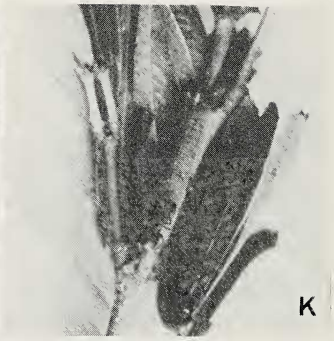

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Figure F. Adult *Juditha molpe*.
Figure G. Adult *Panthiades bitias*.
Figure H. Habitat at El Boqueron, Colombia.
Figure I. Final instar *Panthiades bitias* attended by ants on foodplant.
Figure J. Foodplant *Calliondra globerrima*.
Figure K. *Juditha molpe* final instar attended by a *Campanotus* ant.

light brown. Prothoracic horns blunter and with two setae each. Second smaller horn on each side with one seta each. One additional seta on the mesothorax. Spiracles and myrmecophilous glands light brown. Duration eight days. **Fifth instar larva**: Fig. K. Length 15 to 19 mm. Head capsule

width 2 mm. Color light green and brown mottled. Morphology as in fourth instar. Duration eight days. **Prepupal larva**: Length 19 mm. Color light mottled brown. Duration three days. **Pupa**: Fig. C. Color light mottled brown with striated darker brown marks. Wing cases darker brown than abdomen. Attached by a thin girdle passing over the middle of the body and a silk pad under the last segment. **Imago**: Fig. F.

P. bitias

Third (?) instar larva: Length 5 mm, head capsule width 0.8 mm. Head black, rest light brown and green mottled. Head covered by a hood formed by the first thoracic segment. Second and third segments form a fleshy bifurcated proturbance extending over the first segment. Abdominal segments flat and slightly concave dorsally and convex laterally, giving the larva a hexagonal shape when viewed head on. Yellow spiracles found on segments one through eight dorsally. Last abdominal segments with a broad dorsal plate which is slightly concave at the end. Body covered with small cilia. **Final instar larva**: Figs. D & I. Head black, thorax and abdomen light brown and green. Abdomen with darker green elongated marks dorsally and two yellow marks on the sixth and seventh segments. Morphology similar to the third instar, only with the proturbance of the second thoracic segment and the plate of the abdominal segment being more deeply bifurcated. Duration nine days. **Prepupal larva**: Length 20 mm. Color light mottled brown. Morphology as in final instar. Duration two days. **Pupa**: Fig. E. Wing cases dark green, abdomen light green with three rows of small light brown dots on each side. Attached by silk pad. **Imago**: Fig. G.

Discussion

El Boqueron is a small town located on the border of the Departments of Cundinamarca and Tolima, some 80 km southwest of Bogota at an elevation of 300 m. Here, the boulder strewn Rio Chocho cuts through some high ridges on its way to the Magdalena River, forming a deep and rather picturesque canyon. The area is classified as Dry Tropical Forest (IGAC, 1977, after Holdridge, 1947), with an annual rainfall of between one and two meters. The rains usually fall in March through May, and again in September through November. The dry climate combined with repeated burnings have practically denuded the area of forest, except for thin lines of trees along the streams. The general aspect of the countryside is not unlike that of northern Mexico, with thorny scrub, cacti, and herbacious plants growing on the higher rocky ground (Fig. H). The butterfly fauna is likewise similar to that of the northern neotropics with species such as *Heliconius charitonia, Zeonia cesonia* and *Libythea bachmanni* found commonly following the rains.

The principal foodplant of both *J. molpe* and *P. bitias* at El Boqueron is *Calliondra globerrima* (Benth.) Britton & Killip, family Mimosacae. It

grows commonly along the river bed and is sometimes covered by water during flash floods. Its appearance is that of a small bushy tree with small leathery pinnate leaves and clumps of red and white flowers with long stamens, which bloom at various times during the year (Fig. J). The fruits are elongated bean-like pods about 13 cm long with up to a dozen black seeds inside. This plant does not have extra-floral nectaries, but is often infested with coccids which attract ants of the genus *Campanotus*.

A second plant on which female *J. molpe* were observed ovipositing was *Bauhinia pediolata* (Mutis *ex* DC) Trioma *ex* Hook, family Caesolpinaceae. This shrub has large rounded, pointed leaves, clumps of yellow flowers, and long bean like fruits. Extra-floral nectaries, located on the stems between the fruits and flowers, attract the same *Campanotus* ants as those on *C. globerrima*. *B. pediolata* is a forest species, growing in more shaded localities than *C. globerrima*.

I observed *J. molpe* females ovipositing on both plants between 1200 and 1400 hours. The eggs were laid wherever there were ants, and not on any particular part of the plant. Strangely, I did not observe oviposition on the flowers of *C. globerrima* which is where the larvae feed. Eggs were laid singly, the female feeling the substrate with her abdomen before ovipositing. Nearby ants would make agressive movements in the form of short rushes towards the female, at which time she would fly off. Following one female, I observed six eggs placed on different widely spaced parts of *C. globerrima* in about ten minutes. I was unsuccessful in finding larvae on other nearby *C. globerrima* plants which were in bloom, but without ants. Also, ovipositing females showed little interest in these plants, sometimes investigating them, but always returning to the infested plant to oviposit. This behavior suggests that the main attractant to the ovipositing female *molpe* was the presence of ants, and not mere foodplant availability. This possibility is reinforced by my observations of oviposition on a completely unrelated plant, *B. pediolata*, but which harbored the same ant species. Future searches of *B. pediolata* failed to turn up larvae. In fact, *B. pediolata* leaves presented to the larvae in the lab were ignored in favor of *C. globerrima* flowers. No *B. pediolata* flowers were available during the time of the study to test the larvae preference for this part of the plant.

Upon hatching the small *J. molpe* larvae on *C. globerrima* move to nearby clumps of ripe flower buds where they begin to feed. Immature green buds, flowers and leaves are not eaten, the latter being especially tough and leathery. The young *molpe* larvae pass at least the first two instars inside the bud clumps in the company of small coccids and other insect larvae, possibly dipterids. The larvae lead a solitary existence, and although two or more were found on the same bud clump, they showed little interest in one another.

Upon reaching the third instar, both *J. molpe* and *P. bitias* leave the buds and move to nearby stems or leaves where they may remain motionless for

as long as 24 hours before returning to feed on the buds. When moving about the foodplant, both species weave the head back and forth, spinning a silk web with which they maintain their grip on the plant surface. Their mottled green color and flat profiles make both *molpe* and *bitias* difficult to locate on the foodplant. Their presence was usually betrayed by the ants which showed great interest in the larvae of both species at this stage (Figs. I & K). At least three ants were always observed in attendance, stroking or "drumming" on the larvae, which in turn would secrete honeydew which the ants would eat. The interactions observed between the ants and larvae were similar to those of *Menander felsina* and *Campanotus* ants studied near Rio de Janeiro (Callaghan, 1977).

The myrmecophilous organs of *J. molpe* are located on the eighth abdominal segment and take the form of two slightly raised lumps with a hole in the middle, looking like the nectaries on many plants. Unlike *M. felsina* larvae, there was no observed physiological change in the shape of the glands when stimulated by ants. Nor were there any organs similar to the lateral tubercles of *Lemonias caliginea* (Ross, 1966) or various species of *Audre* (Pers. Observation). The "horns" on the prothorax of *J. molpe* were observed to be passive organs, though the long setae protruding from each would suggest that they had a sensory role. When disturbed, the *J. molpe* larvae raise the front half of the body and flop it around, as do various species of *Actinote* (Pers. Observation).

The *P. bitias* larvae were equally attractive to ants. However, observation under magnification failed to reveal any distinct myrmecophilous organs. The interest shown by the ants in the dorsal plate covering the last abdominal segments suggests that the organs, perhaps very small, are located in that area (Fig. I). The *P. bitias* larvae did not respond vigorously when disturbed; instead, they would simply move slowly away. Malicky (1971) has described the presence of microscopic epidermal glandular organs which appear to secrete an ant attracting pheromone. These may not be associated with Newcomer's organ and the obvious "honeydew" secretions.

As in the case of *felsina*, the ants protect the larvae against predation. When I touched a larvae of either species with a stick, the ants became very excited, running about and exuding great quantities of formic acid which I could smell on my hands hours later. To eject the acid, however, these *Campantus* do not rise up on their hind legs as was observed in Brazil (Callaghan, 1977). The formic acid had no apparent effect on the larvae.

The only aggressive behaviour noted on the part of the larvae was the eating of a *J. molpe* pupa by two *molpe* larvae. The larvae had been without food for two days which I suspect was the reason for their action. This suggests that the *molpe* larvae may resort to cannibalism if their food supply fails.

Both *molpe* and *bitias* have a prepupal stage lasting two and three days

respectively in which they stop feeding and remain motionless on the stem of the foodplant. They turn a mottled brown color, and, in the case of *bitias*, release a large amount of honeydew, no doubt attracting ants which may provide protection during this vulnerable stage. The larval skin is then shed and the pupal case hardens. In the case of *bitias*, the imago emerges about a month later.

Acknowledgments. I wish to thank Dr. Woodruff Benson for reading and making helpful comments on the manuscript; Mr. Stanley Nicolay for determining and providing information on *P. bitias*; and Dr. Gustavo Lozamo C. and Dra. Isabel S. de Arevalo of the Instituto de Ciencias Naturales, Bogota, for securing identification of the plant species. Finally, my thanks to Dr. Ernesto Schmitt-Mumm of Bogota for caring for the larvae during my absence.

Literature Cited

CALLAGHAN, C. J., 1977. Studies on Restinga butterflies I. Life cycle and immature biology of *Menander felsina* (Riodinidae), a myrmecophilous metalmark. J. Lep. Soc. 31(3): 173-182.

GUPPY, J., 1904. Some notes on the early stages of Trinidad butterflies. Trans. Ent. Soc. Lond. p. 227.

Instituto Geografico "Agustin Codazzi", 1977. Zonas de vida o formaciones vegetales de Colombia. Bogota, 237 pp.

MALICKY, H. 1971. New aspects on the association between Lycaenid larvae (Lycaenidae) and ants (Formicidae, Hymenoptera). Jr. Lep. Soc. 24: 190-202.

MUYSHONDT, 1973. Jr. Lep. Soc. 27: 210-219.

ROSS, G. N., 1966. Studies on Mexican butterflies IV, The ecology and ethology of *Anatole rossi*, a myrmecophilous metalmark. (Lep. Riodinidae) Ann. Ent. Soc. Amer. 59: 985-1004.